Singular Value Decomposition - Worksheet

Give an explanation for True/False

1. *(True/False.)* The matrix $\mathbf{D}$ in the singular value decomposition is diagonal and contains the same eigenvalues that are output in PCA.

2. *(True/False.)* Principal Component Analysis involves the SVD of a data matrix which has been centered or standardized.

3. *(True/False.)* The matrices $\mathbf{U}$ and $\mathbf{V^T}$ in the singular value decomposition are orthogonal, and that means their inverse is equal to their transpose.

4. *(True/False.)* When we omit principal components with small eigenvalues, the information we lose has a larger signal-to-noise ratio than the information we keep.

BONUS: *(True/False.)* The default factors displayed in SAS's proc factor results window are the rows of the matrix product $\mathbf{DV^T}$ where $\mathbf{X} = \mathbf{UDV^T}$ is the SVD of your standardized data matrix $\mathbf{X}$.

List of Key Words/Phrases.

singular value decomposition
PCA and SVD relationship
signal-to-noise ratio